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SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
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FRIDAY, AUGUST 21, 1903.

THE NEW OPPORTUNITY FOR SECONDARY
SCHOOLS.

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MSS. intended for publication and books, etc., intended
for review should be sent to the responsible editor, Pro-
fessor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

PROFESSOR G. G. RAMSEY, of the Univer-
sity of Glasgow, said last November in an
address on 'Efficiency in Education,' while
speaking of the need of new definitions and
new standards in education:

"It is not merely that new subjects have
been introduced for which a place must
be found; but also that the demand for
higher education of some sort, and of the
best sort available, is being made on behalf
of a much wider and larger class than
formerly. It is no longer a select class,
consisting of those destined for professions
and the higher walks of life, whose needs
demand attention; the nation has at last
been roused to the necessity, which many
of us have been preaching all our lives as a
matter of national concern, of training to
the utmost the brain power of the com-
munity, and of bringing within the reach
of every capable mind, in every class,
the benefits of a liberal education. There
is," he adds, "at this moment a boom on
amongst us in this matter of higher edu-
cation; and it is of the greatest consequence
to the country that this boom should ex-
pend its force in the most promising direc-
tions."

In the course of his address, this eminent
'professor of humanity' frankly admits
that, 'the highest literary and classical edu-

cation appeals to only one side of human culture.'

There is nothing very new in this last remark, for we have all said the same thing in some form, but it is new to have such a man say it so plainly. It reminds one of an earlier plea for a broader system of training by Dean Farrar, in which he said, after thirteen years' experience as Master of Harrow: 'I must avow my distinct conviction that our present system of exclusively classical education, as a whole, and carried on as we do carry it on, is a deplorable failure. I say it knowing the words are strong words, but not without having considered them well. It is no epigram, but a simple fact, to say that classical education neglects all the powers of some minds, and some of the powers of all minds.'

But it is not my purpose to attack nor my wish to undervalue classical culture. There is not a single well-arranged course of literary study which I wish to overthrow. What I ask is the establishment of additional courses, which are as truly liberal and, for the great majority of youth, much more efficient and timely. I have quoted two eminent, open-minded authorities to the end that all of us may be open-minded in the consideration of the great educational problems of to-day.

The opportunity and duty for secondary schools rest upon two conditions which must be briefly stated: First, secondary education is becoming more general; in the next place, the demand is imperative that the curriculum of the secondary school become* broader. Let us examine these conditions.

1. There is an increasing tendency to require school attendance up to a certain

* I do not accept the fanciful distinction President Hadley makes between secondary education and the curriculum of the secondary school. To me they mean the same.

age or to the completion of a certain standard of scholarship. Recent legislation is in the direction of more schooling and higher education, and even where legislation is wanting, public opinion is strongly in that direction; this is conspicuous where manual training has been incorporated into the secondary program.

In England and Germany elementary education is compulsory and, therefore, universal up to what we call the high school. The same is true in many states in this country. A few years ago there was serious opposition to high schools supported by taxation, and the great mass of children had no expectation of entering a secondary school. At the present time that opposition has vanished, and in many communities it is the rule and not the exception for a graduate of the highest grammar grade to enter the high school.

The rapid growth of the secondary school can not escape observation. The increased range and efficiency of the grammar schools is partly the cause and partly the consequence of increased privileges in the way of high schools. This is strikingly shown in many cities, notably in the two chief cities of Missouri, St. Louis and Kansas City. In St. Louis the board of education is building two fine manual training high schools, which will be opened for students next year. These schools have long been necessary, but an unfortunate provision in the state constitution kept the school tax at so low a rate that the secondary features were greatly neglected. Nearly a year ago the constitution was amended, raising the limit of taxation for schools from four mills to six mills per dollar of assessed value, or a dollar and a half of actual value. To a surprising degree the prospect of new schools has strengthened the higher grammar grades. The feeling that the high schools belong to all children is taking deep

root, and I predict that the high school attendance in St. Louis will double within two years.

This result has actually been achieved in Kansas City. Its high school attendance has in seven years increased *one hundred* per cent., while its population has increased *fifty* per cent. This is largely explained by the organization and equipment of what appears to me to be the largest and most successful manual training high school in the world. The enrollment at the manual high school has been as follows from the start, beginning with 1897: 843, 1,114, 1,244, 1,492, 1,677, 1,706 in 1903.

But not the west alone. The high school attendance has increased 48 per cent. in Springfield, Mass., while the population has increased 19 per cent. In Worcester, Mass., the high school attendance increased 124 per cent., while the population increased 36 per cent. Boston and Philadelphia show similar gains; in short, there is hardly a prosperous community where a similar growth is not observed.

It would be unreasonable to attribute this growth to any one thing, as for instance the introduction of manual training. Beyond question that has had much to do with it, but increased wealth, improved social conditions and a growing conviction that education is a good business investment, have had much to do with bringing about this gratifying result. Twenty years hence secondary school diplomas will be relatively as numerous as elementary school diplomas were twenty years ago.

2. We must be getting our houses in order to receive, educate and train the coming army of boys and girls. They will want the best, and their wishes will be law. The demand for broader curriculum for the secondary school is imperative. The classical academy and the classical high school will continue to exist and do valuable work.

No one who knows the value of high grade classical training wishes to do away with such schools or to lower their moral and intellectual tone, but we must not shut our eyes to the fact that they do not cover the whole field of secondary education, nor do they meet the wishes and needs of the great majority of fourteen to fifteen and sixteen-year-old boys and girls. It is not a question of brains, nor of morals, nor of health; it is a question of environment, of taste, of ambition, of outlook. The men and women who are to do the world's work need and wish to be trained to do it well. They must not only be strong, but they must be versatile, skillful and wise. Solomon prayed for a 'wise and understanding heart.' In a measure that is what every healthy boy and girl prays for. I would put emphasis on the word 'understanding.' Everything in education should conduce to understanding, just as everything which conduces to understanding is education. I have no use for studies which yield culture without understanding—in fact I deny that there is valuable culture without understanding. I have no patience with people who know that a study is useful only in proportion as it is understood, and yet claim that its culture value is inversely as its utility in practical life. Whether we teach Latin, geometry, physics, the theory of a tool or a process of construction, let us give our pupils understanding. The pupil who has formed the habit of understanding what he sees or reads or handles will carry into the world the habit of studying life's problems with eyes, hands and brain, till he understands them.

There is really no necessity for a plea for new courses of study in the secondary school. We are substantially agreed on that point. Not one half of the boys and girls of Boston ever get inside of a high school. Why is it? The high schools are

supported by taxation and they are as free as the grammar school to all. It is not because the people are poor—that excuse would cover but a small per cent. of the absentees. It is not because they have not ample brains and average common sense. A small percentage are undoubtedly stupid, but some of the stupid, as we all know, find their way into the high schools and colleges. These two reasons, poverty and stupidity, are the reasons generally given, but the great bulk of the absence from secondary schools has still to be explained.

In my judgment the best word to explain the non-appearance of over fifty per cent. of boys and girls in our secondary schools is 'incompatibility.' There is a lack of harmony. The school does not give what the pupils want.

Now do not jump to the conclusion that because the boy does not want what the school has to give he is altogether unreasonable and low-minded. He wants, as Emerson says, 'an education to things.' He sees the world at work around him and he knows that he must work, and he wants an education that will enable him to work intelligently, efficiently and to his advantage. If he is conscious of capacity, the school must convert it into faculty. The school must help and not hinder him. He cares not for authority, has no respect for traditions, and ancient history does not interest him. He wants the latest news; he respects what is in force to-day; he must see with his own eyes; he himself must unlock the doors, and with his own hands unbar the gates of the future. He believes that Robert Ingersoll told the truth when he said that, "Much that is called education simply unfits men successfully to fight the battle of life. Thousands are to-day studying things that will be of exceeding little importance to them or others. Much valuable time is wasted in studying

languages that long ago were dead, and histories in which there is no truth."

And when those boys who *must* make their own living and build their own homes, and those who *wish* to make their own way in the affairs of the world, turn away from continuous literary studies, even the literary world approves their choice. It would be the height of folly to go into the streets, the shops, the factories, the stores, the offices, the fields, the gardens, the stables and the general loafing places—to go into all the places where fifty or sixty per cent. of the boys from fourteen to seventeen years are found, and, if we could, bring them all into school and teach them Latin, Greek and mathematics, as I was taught till I was eighteen years old, as though we expected them all to go on to college, and become literary or professional men.

Said President Wilson, of Princeton, in his inaugural address: "The college is not for the majority who carry forward the common labor of the world, nor even for those who work at the skilled handicrafts which multiply the conveniences and the luxuries of the complex modern life. The college is for the minority."

The average secondary school, if it prepares pupils for anything, prepares them for college; and since the college is not for the majority, the secondary school is not for the majority. What then is there for the majority? If they are to have secondary education at all it must be something different.

The curriculum must be broadened. It must touch modern life, modern conditions, modern forces, modern responsibilities. As Huxley expressed it: 'It is folly to continue, in this age full of modern artillery, to train our boys to do battle in it equipped only with the sword and shield of the ancient gladiator.' Sir Lyon Playfair changed the figure in protesting against

the English system of secondary education, as follows: "In a scientific age and in an industrial section, an exclusive education in the dead languages is a curious anomaly. The flowers of literature should indeed be cultivated, but it is not wise to send men into our fields of industry to reap the harvest, when they have been taught to pick the poppies and push aside the wheat."

When the wide-awake, inquisitive boy knows that electricity, and steam and heat, and the art of designing and constructing automatic machines can be studied and understood with no more effort and in less time than it takes to commit to memory a Latin grammar, or to read Demosthenes without a dictionary, and that those former things are ten times as interesting as the latter, and a hundred times as likely to be of service to him in the struggle for life and the battle for success, he will choose them if he has a chance. And it is our business to give him a chance. To quote Emerson again: 'We must take the step from knowing to doing.' I read the other day that in Indianapolis, Ind., where they have two fine high schools, one of the older and one of the newer type, 580 pupils from the grammar grades applied for admission to the high schools. Four hundred of them, or 69 per cent., applied for the manual training high school. This indicates not so much a change of sentiment in regard to the values of the classical school as the creation of a new high school constituency.

We want living languages and living issues. We must teach the duties of an American citizen rather than the manner of life of a slave-owner in Athens or Babylon. We must teach the mechanics, hydraulics, electricity and chemistry of to-day rather than the physical theories of Aristotle and the alchemists. We must illustrate and explain the battle of Santiago rather than the battle of Salamis. It is a

thousand times more interesting and more useful to the average boy to know how modern engineers tunneled under the Alps than to read the fabulous stories of how Hannibal made a road over them; to know how Eads built a railway bridge across the Mississippi, than to decipher Cæsar's foot-bridge over the Rhine; to analyze and comprehend the water-works of Boston or London, than the hydraulic system of ancient Rome, marvelous as it was; to master the universal language of drawing, than to get a smattering of a language which no one speaks and no one writes; to become familiar with modern methods of construction and the skillful use of tools and machinery, than to speculate over the Tower of Babel or the Pyramids of Egypt.

Here is the magnificent opportunity for the secondary school; to use a military phrase, let it change front and face the world of to-day. Let it open all its doors and windows to the humanities of to-day. Look around you and look forward, not always backward. Weep not, as Ruskin did for departed days, for the lumbering stage-coach, the storm-driven wooden ships, the hand loom, the log hut, and the good old days of blissful feudalism. I am amazed when I think how much we are spellbound by tradition. Perhaps I have been as foot-loose as any of you, yet I find myself continually approving of educational features for no good reason except that they are fashionable. We somehow seem to think it means far more and is in far better form to know that the nymphs gave Perseus a helmet which Vulcan made for Pluto, and which rendered him invisible, than to know that Thomas A. Edison invented the incandescent lamp and made it possible for Niagara Falls to light a hundred thousand of them, twenty-five miles away; and yet we don't believe one word of the former

story, while we accept every word of the latter.

It is of course a matter of association. Sir Leicester Deadlock, in *Bleak House*, could not endure a man who experimented with a steam engine and who seemed quite at home with a coal-burning furnace. He drew inferences as you and I do. Sir Leicester inferred that the man who understood engines and power houses must be ignorant of polite learning and unfamiliar with the ways of good society. So you jump to the conclusion that the man who knows all about Edison and the generation of electricity is probably ignorant of Greek mythology and not proficient in spelling.

Well perhaps you are right and perhaps you are wrong. But this is certain: It is no longer safe to assume that your engineer or your electrician is an uneducated man, or that he lacks culture. There is more than one kind of culture. Emerson speaks of 'having a mechanical craft for culture.' By culture I mean a knowledge of some of the best things that have been done and said in the world; a certain refined and gracious spirit; a soul of honor; a depth of human sympathy; a wise and understanding heart; an all-pervading love for what is useful and true, and therefore good and beautiful. That kind of culture can be gained with or without much ancient literature; with or without much mathematics; with or without the physical, biological or dynamic laboratory; with or without the art room or the drafting room; with or without the theory of typical tools and correct methods of construction. There is no necessary divorce between the skilled hand and the cultured mind; both are needed for the highest culture.

I am not pleading to-day for the minority who are already in our secondary and higher schools. I am not asking that you

deny the 'classics' to those who ask for them. Get the classic arts and the mechanics too if possible; but I am pleading for that vast majority who are not in secondary schools but who are coming, many of whom will inevitably go on to our colleges and technical schools. I beseech you, set up no narrow aims, no insufficient motives in managing these schools. Then let us broaden the spirit and scope of the colleges and universities. Nine out of ten of them assume that the college curriculum is for students aiming at five professions or occupations, including teachers and 'people of leisure.' The last are those who inherit wealth, and are, therefore, not under the necessity of earning their own living. When Hawthorne got through college he carefully scrutinized the occupations which seemed to be open to him. He reported his conclusions as follows in a letter to his mother: 'I can not become a physician and live by men's diseases; I can not be a lawyer and live by their quarrels; I can not be a clergyman and live by their sins. I suppose there is nothing for me to do but write books.'

Now the majority who are coming will inherit no wealth; they expect and desire to earn their own living. We do not need them as lawyers, or ministers, or doctors; we hope they won't all write books; we do need them as teachers, as engineers, as accomplished workmen in our industries and in our unhistorical methods of trade and commerce. Let us persuade them that education and skill dignify and adorn every occupation, every calling; that the legitimate fruit of a combination of literary and scientific culture and technical skill in dealing with materials and forces will be a generation of stronger, abler and more successful men in industrial, commercial and political life.

Let us begin, if you please, by training

a part of this majority to become superior craftsmen, rather than to feel that they are superior to all crafts, and to be unwilling to be put to any.

Let us avoid the serious mistake of educating the majority as though they were a privileged minority. Let us accept once and for all the doctrine that any occupation may be ennobled, enriched and dignified by education, training, and skill; that there are a score of new professions requiring a high order of intellect, and the close and continued study of subjects as difficult and as profound as are the branches which lead up to the so-called learned professions.

The educated and highly accomplished architect or engineer is a learned man, and he stands second to none in the forum and in the arena of activity to-day. There is a great and an increasing demand for such men in every city in the land. I have been training engineers for nearly half a century, and I know how inadequate the supply is. In St. Louis we are quite unable to furnish graduates of our manual training school as fast as they are wanted in all kinds of industrial work. The other day I was told that there were twelve hundred educated engineers in Pittsburg, and the demand was continually for more. The number of students in the technical schools—that is, the schools for applied science in the various branches of engineering and architecture—ought to be as numerous as in colleges for letters and pure science, and they will be as numerous when the secondary schools recognize the majority as they now do the minority. The number of students in colleges and higher technical schools is increasing in this country at the rate of five per cent. every year.

What has been done in Philadelphia, Kansas City and in some other cities, and what is now doing in St. Louis, ought to

be done in every city that can maintain a high school, viz., offer facilities for a secondary education looking towards industrial occupations and technical professions equal, at least, to those offered for students looking forward to clerical or mercantile occupations and the traditional professions.

Are you doubtful about the intellectual, moral and social standing of the graduates of schools which incorporate a thorough course of manual training, including practical drafting with a modest academic course? If so, it will be of value if I give you the record of the graduates of a high grade manual training school which has been in existence twenty-three years and has graduated twenty classes. I refer to the school connected with Washington University in St. Louis.

Before I read the list please bear in mind that the school does not aim to produce mechanics. Not every boy is fit to be, or has the ability to be, a good mechanic. When the whole boy has been put to school three or four years he finds out what his strong points are, if he has any, and he works into the occupation where he is most likely to achieve success. In point of fact the round plug gets into the round hole, and the square plug gets into the square hole, with an infinite sense of compatibility pervading both plugs and holes. Many graduates who started life as mechanics have pushed along, and have been called up higher, to greater responsibilities and to larger rewards. We do not pretend to know what a boy is by nature best fitted for, nor what opportunities his environment will offer. We attach no value to the whims and fancies of a thirteen-year-old boy, and very little to the ambitious hopes of parents. When a boy stands foursquare on a broad foundation he is pretty sure to build aright.

OCCUPATIONS OF THE GRADUATES OF THE MANUAL
TRAINING SCHOOL OF WASHINGTON UNI-
VERSITY, ST. LOUIS.

Agriculture and stock raising.....	14
Architects	24
Artists	4
Banking	7
Bookkeepers, general assistants and clerks...	153
Cashiers	5
Chemists	9
Contractors	2
Dentists	4
Draftsmen	100
Electricians	19
Fieldmen	4
Foremen	3
General managers	32
Insurance	9
Lawyers	30
Library	1
Mechanics	12
Merchants and manufacturers	90
Ministers	1
Physicians	22
Real estate	18
Reporters	2
Salesmen and agents	41
Students	59
Superintendents of manufactories	44
Teachers	39
Technical engineers	63
U. S. Navy engineers	4
Miscellaneous	12
Unknown	56
Number who have taken degrees elsewhere after leaving the Manual Training School...	159

This outcome suggests an important function of a secondary school which I have not seen clearly stated. The secondary school should enable a boy to discover the world and to find himself.* I use the word 'discover' in the sense of *uncover*, that is, *lay bare* the problems, the demands, the openings, the possibilities of the external world. A boy finds himself when his internal world is laid bare to a conscious examination and inventory.

* "The successful school must achieve two positive results: on the one hand it must reveal the world to the pupil; on the other it must reveal the pupil to himself."—Walter J. Kenyon, in the *School Journal*, March, 1893.

If the secondary school shall do those two things well it will do what generally has never been done at all. This can not be done with a single curriculum, along any line. All your windows and doors must be open.

While I plead for the neglected majority and point out the glorious opportunity of the secondary school I must speak a word for the benefit of the minority to whom of course all of us belong.

The great mass of American teachers has as yet no adequate conception of the fine invigorating effect of a correct system of manual training upon the mind and character of a healthy, normal boy. I do not refer to manual training falsely so called; to the wishy-washy tinkering with tools and materials where the child is the victim of his own whims, and of his teacher's ignorance; where under the pretense of developing originality, altruism or concrete expression, the child is prematurely misled, misdirected and mistreated, until the possibility of well-timed and well-regulated manual training is utterly lost. I regret that I must speak so strongly of a tendency utterly to emasculate manual training by a method of treatment which would be instantly condemned if applied to any other branch of study. We must, I suppose, excuse a great deal of sentimentalism and extravagance on the ground that the most recent converts are apt to be unbalanced by excess of zeal.

Manual training furnishes many of the elements of culture and discipline which are lacking in the ordinary secondary course of study. Contact with the concrete; clear concepts of materials, forces and instrumentalities; exact knowledge of mechanical processes; analyses of complex operations; the idea of precision; habits of system, of foresight and of intellectual honesty. These mental, moral and phys-

ical elements are invaluable. It is not strange that President Eliot said: "Manual training not only trains the eye and hand, but develops the habit of accuracy and thoroughness in any kind of work. It develops the mental faculties of some boys better than books do." Professor James, of Harvard, says that "The most colossal improvement which recent years have seen in secondary education lies in the introduction of manual training." And Dr. Stanley Hall says: "No kind of education so demonstrably develops brain as hand training."

The minority should have the benefit of this improvement and of those benefits most assuredly. So here is another splendid opportunity for the secondary school.

To a graduate of Harvard who has for years labored assiduously in secondary and higher technical education to establish a system of instruction which looks squarely towards modern developments in science and the industrial arts, it is extremely gratifying to find his *alma mater*, under the leadership and inspiration of its distinguished president, taking high ground both in the organization of technical branches of instruction and in the vindication of their dignity and worth. One is led to apply to Harvard the language the *London Times* used in speaking of the establishment of engineering courses in the University of Cambridge, England: "It is pleasant to see our oldest university, while remaining faithful to all the traditions of its venerable past, at the same time displaying an intelligent appreciation of the wants of the future, and affording to the most modern forms of learning the nurture and support which, for many centuries, it has afforded to those forms with which alone our forefathers were familiar."

C. M. WOODWARD.

June 4, 1903.

TEN YEARS OF AMERICAN PSYCHOLOGY:
1892-1902.

II.

THE RELATION OF THE ASSOCIATION TO OTHER
SCIENTIFIC ORGANIZATIONS.

Our association began its career as an academic affair. Fourteen universities and one lunatic asylum were represented among the original twenty-six members. Just one third of the institutions were in New England and shared just fifty per cent. of the membership. Since then every meeting has been held under the wings of a university. Until the fourth annual meeting, the psychologists were content to stand on their own feet scientifically, and not to yield to the social attractions afforded by joining the numerous groups of scientists which were meeting here and there over the country. In 1895 the psychologists met for the first time with the American Society of Naturalists and Affiliated Societies. The philosophical pressure upon our organization came to something of a focus at this time, and was yielded to a year later, which was marked by a sudden influx of metaphysical papers and the formation of a section for the presentation of them. Seven meetings have been held with the naturalists, with whom a joint discussion has been held four times on various themes, in which a psychologist has participated as our representative. Our association has been invited four times to turn aside from its individual or annual way, and unite its associated interests with other scientific organizations, such as the American Association for the Advancement of Science and the British Association for the Advancement of Science. Joint sessions have also been held with the American Physiological Association, the Western Philosophical Association, and two summer meetings in connection with Section H,